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<b>(54) Title:</b> CORK CLOSURE HAVING A DURABLE LIQUID IMPERMEABLE COAT SO TO PREVENT TAINTING		
<b>(57) Abstract</b>  A closure for a container having an opening, comprising a mass of cork wholly or partially encapsulated in at least one durable, liquid-impermeable coat of a coating material(s) so as to isolate any taint-producing agents present in the mass of cork from the contents of the container. The term "durable, liquid-impermeable coat" refers to coats that are sufficiently enduring to remain liquid-impermeable following sealing insertion of the coated closure into the opening of the container.		

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## CORK CLOSURE HAVING A DURABLE LIQUID IMPERMEABLE COAT SO TO PREVENT TAINTING

This invention relates to closures for containers, particularly wine bottles.

5 Wine bottle closures made from natural cork can be the source of chemicals which may produce mouldy taints in the contents of the bottle. These chemicals (such as trichloroanisoles) may originate from the bleaching process used for cork which involves treatment with chlorine or other chloro compounds and/or oxalic acid. Wine which has been exposed to such  
10 chemicals is described as being "corked", and it has been estimated that up to 10% of all bottles of wine sold worldwide may be corked in this manner.

This problem has been exacerbated in recent years due to the increasing use of corks made from agglomerated particles of recycled corks. Whilst having significant cost advantages over "virgin" cork closures, these so-called "agglo"  
15 corks appear to have a greater tendency to taint wine, probably, in part, as a result of the glue used.

Consequently, the wine industry is in great need of methods and/or closures which avoid the tainting problems associated with corks. To this end, two alternative closures have been proposed, namely the screw-cap "stelvin"  
20 closures and plastic "champagne-style" corks. Whilst these types of closures produce an excellent seal, their use has been limited to low grade wines due to their poor aesthetic qualities.

It is now proposed that cork closures may be encapsulated in a coating material(s) so that the wine is prevented from directly contacting the cork,  
25 thereby avoiding the possibility of producing taints.

Accordingly, the present invention provides a closure which may be sealingly inserted into an opening in a container, comprising a mass of cork wholly or partially encapsulated in at least one durable, liquid-impermeable coat of a coating material(s) so as to isolate any taint-producing agents present  
30 in said mass of cork from the contents of the container.

With regard to the durable, liquid-impermeable coat, the term "durable" is to be taken to mean that the coat is sufficiently enduring to remain liquid-impermeable following sealing insertion of the closure into the opening of the container.

35 The coating material(s) is preferably selected from the group consisting of polyethylene dispersions, modified polyethylene dispersions and gels of

polymers such as ethylene vinyl acetate copolymer (EVA), solutions and dispersions of poly(vinylidene chloride) and its copolymers (e.g. foamed and non-foamed PVC), polyurethanes, acrylic latexes, lacquers and dispersions and various silicones. The coating material may also be selected from "covering" materials such as thermoformed films, particularly tubular thermoformed films. Most preferably, the coating material(s) are selected from the group consisting of PVC's and polyurethanes.

It is clear from the above, that the closures according to the invention may have multiple coats of coating material(s). In such closures, each coating may be the same or different in composition. Including multiple coatings, may also assist in the production of closures having a more uniformly smooth surface (which may enhance the sealing qualities of the closure). Harder coating materials such as some PVDC's and hard acrylics may also be machined using a polishing brush or the like to provide a smooth surface.

The PVC's also show low friction qualities which can assist in the insertion and extraction of the closure from the opening of a container. These low friction qualities may also be varied by adjusting the amount and/or kind of plasticiser used or extenders (in the case of polyurethanes).

Standard cork and "agglo" closures are often coated with very thin layers of paraffin wax or silicone to assist insertion and extraction, however, it is clear that these materials and/or the thickness of the coat, are not sufficiently durable to form a liquid-impermeable coat, as tainting problems are still observed.

Very thin layers of paraffin wax and/or silicone may be similarly coated onto the outside of closures according to the present invention in order to assist insertion and extraction.

Where the contents of the container is a food or beverage, the coating material(s) would be selected from those which are "food-contact approved".

The total thickness of the coat(s) may vary depending on the application of the closure from 0.1 to 5.0 mm or more. For wine bottle applications, the total thickness of the coat(s) is preferable 0.2 to 2.0mm, more preferably 0.2 to 0.5mm.

To apply the coating material(s) to the mass of cork, it may be necessary to dry (e.g. by microwave or hot air tumbling) or pre-treat the mass to improve adhesion or incorporation. The pre-treatment(s) may be selected from chlorine treatment, UV treatment and other oxidising treatments.

The coating material(s) may be applied onto the mass of cork by dipping, spraying and/or injection moulding.

The coat(s) may only be applied to a portion of the surface of the mass of cork. For example, the coat(s) may only be applied to the face(s) of the closure that is likely to contact the contents of the container.

The cork used in the closure may be sterilised by means of the conventional treatments with chlorine or other-chloro compounds and/or oxalic acid, as well as by other means. Where the closure comprises particles of cork, the individual particles maybe encapsulated in at least one durable, liquid impermeable coats of coating material(s).

Closures according to the invention may be readily adapted to be suitable for sealing openings in many different kinds of containers. However, the closures are primarily intended for use in the wine and spirits industry, and particularly for sealing wine barrels and wine bottles. Accordingly, the closures are hereinafter described in respect to their use in sealing wine bottles.

Depending upon the desired thickness of the coat(s), closures according to the invention for use in sealing wine bottles may be produced using standard cork closures as purchased from a cork supplier. Where thicker coating(s) are required (e.g. 2.0 to 3.0mm) it may be necessary to use corks of reduced diameter otherwise the closure may be too difficult to insert or extract.

### Preparation of Coated Cork Closures

#### 1. PVC Plastisol Coatings

Two suitable PVC plastisols are W.R. Grace AD07-2126.3 (which does not foam when heated to 180°C for 5 minutes) and Daraseal 700 (Sicpa) (which foams under these conditions). The coating may be achieved by first pouring plastisol, (7g for 48mm cork length) into a cylindrical aluminium mould, 48mm deep with an internal diameter of 20mm. A cork of 20mm diameter is then lowered carefully into the mould to within 4mm of the bottom. The mould and its contents is then heated in a fast-recovery oven at (180°C for non-foaming and 200°C for foaming) for 5 minutes, followed by cooling before removal of the coated cork. The base of the mould is unscrewed and the cork removed. When the non-foaming PVC is used the coated cork will have a PVC layer approximately 1mm thick around the diameter and 2mm thick at the bottom. When the foamable plastisol is used the foam layer will be approximately 1.5mm thick at the sides and 3-4mm thick at the bottom.

The non-foaming plastisol is essentially transparent and light pink in colour so that the cork will be seen inside the coating. The foam layer is white and opaque.

5    2. Latex Coatings

Cork may be coated in latex (e.g. Glascol C36, Michelman X300) by dipping into a container of latex leaving the top uncoated if desired. The cork is then removed and placed immediately into a fast recovery oven at 105°C for five minutes, then re-immersed in the latex and placed in a fast recovery oven  
10    at 95°C for five minutes.

3. Thermoformed Skin Coatings

Corks of 20mm diameter and 48mm length or as required may be covered with a commercial laminating adhesive (e.g. Lamal, Coates Bros,  
15    Sydney) and coated by thermoforming a skin of Surlyn (Du Pont plastics) ionomer film around them on a commercial blister packing machine. To prevent creasing of the skin, tubular forms of thermoformed skin may be used.

20        It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

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**CLAIMS:-**

1. A closure which may be sealingly inserted into an opening in a container, comprising a mass of cork wholly or partially encapsulated in at least one durable, liquid-impermeable coat of a coating material(s) so as to isolate any taint-producing agents present in said mass of cork from the contents of the container.
2. A closure according to claim 1 wherein the coating material(s) is selected from the group consisting of polyethylene dispersions, modified polyethylene dispersions, gels of polymers, solutions and dispersions of poly(vinylidene chloride)(PVC's) and its copolymers, polyurethanes, acrylic latexes, lacquers and dispersions, thermoformed films and silicones.
3. A closure according to claim 2 wherein the coating material(s) is selected from the group consisting of ethylene vinyl acetate, acrylic latexes, PVC's and polyurethanes.
4. A closure according to claim 3 wherein the coating material(s) is selected from the group consisting of PVC's and polyurethanes.
5. A closure according to any one of the preceding claims wherein the mass of cork is wholly or partially encapsulated in multiple durable, liquid-impermeable coats of a coating material(s).
6. A closure according to any one of the preceding claims wherein the mass of cork is wholly encapsulated in said at least one durable, liquid-impermeable coat of a coating material(s).
7. A closure according to any one of the preceding claims wherein the total thickness of the coat(s) is 0.1 to 5.0mm.
8. A closure according to claim 7 wherein the total thickness of the coat(s) is 0.2 to 2.0mm.

9. A closure according to claim 8 wherein the total thickness of the coat(s) is 0.2 to 0.5mm.

# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/AU 96/00146

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int Cl <sup>6</sup> : B67B 1/03, 1/04		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC: B67B 1/03, 1/04; B27K 7/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DERWENT		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0365439, A (RHONE POULENC CHIMIE) 25 April 1990 See entire document	1-9
X	AU 18555/83, A (CORK SEALS (AUST) PTY. LTD.) 8 March 1984 See entire document	1-9
X	AU 47995/85, A (JONES, STEAINS AND WALLER (N.S.W.) PTY LTD) 10 April 1986 See entire document	1-9
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
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Date of the actual completion of the international search 17 May 1996		Date of mailing of the international search report 24TH MAY 1996.
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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 889221, (W. BRODHAGE KORKEN-UND KORKWARENFABRIK) 30 July 1953 See entire document	1-9
X	CH 487715, (CUSHIONED PRODUCTS CORPORATION) 15 March 1970 See entire document	1-9
X	EP 0515806, A (LA TECNOCHIMICA S.A.S. DI UGO MESTRALLET & C.) 2 December 1992 See entire document	1-9

## INTERNATIONAL SEARCH REPORT

### Information on patent family members

**International Application No.**  
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**This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.**

Patent Document Cited in Search Report				Patent Family Member			
EP	365439	AU	42664/89	BR	8905227	FR	2637605
		US	5004771				
AU	18555/83						
AU	47995/85						
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EP	515806	IT	1248469				
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